

PATENT SPECIFICATION



Application Date : June 10, 1938. No. 17295/38.

577,786

Complete Specification Left: July 10, 1939.

Complete Specification Accepted: May 31, 1946.

PROVISIONAL SPECIFICATION

Improvements relating to Gun and Camera Gun Mountings

We, REID & SIGRIST LIMITED, a Company incorporated according to British Law, of Shannon Corner, Kingston By-Pass, New Malden, Surrey, and CHARLES BOWER, a British Subject, of the Company's address, do hereby declare the nature of this invention to be as follows:—

This invention relates to gun mountings more particularly for use in aircraft, and has for an object to provide a mounting for a machine gun, camera gun, or like weapon which is simple and light in construction, and which permits the movement of the gun into desired positions, whilst also permitting it to be neatly stowed, preferably within the contour of the fuselage, when not required for use. A further object of the invention resides in the provision of a mounting which does not impede the movement of the gunner in his cockpit, and is capable of being housed in the stowed condition beneath a cockpit cover which can be opened when required for operation of the gun.

According to the present invention a gun mounting, more particularly for use in aircraft, comprises a single gun supporting arm mounted for universal movement in the structure carrying the gun, e.g. the aircraft. Preferably means are provided for locking the arm in set attitudes for maintaining the gun in positions convenient for firing in desired directions. It will be appreciated that the connection between the gun and supporting arm will in general have some degree of freedom, e.g. pivoting about a transverse axis combined with relative rotation of the gun about its longitudinal axis. In a preferred form of the invention the arm is mounted in the supporting structure by means of a ball and socket joint, in which the locking means may comprise a cam or otherwise operated clamp urging the ball to engage the socket frictionally, or urging a partly spherical friction-pad against the ball.

One arrangement according to the present invention comprises a supporting arm of tubular metal and of length preferably equal to at least half the width

of the cockpit opening of the aircraft carrying the mounting. One end of the arm has rigidly secured to it a ball fitting of a ball and socket joint, the socket part of which is internally hemispherically concave, with a short downward cylindrical skirt. In the hemispherically curved wall of the socket is a circumferential slot which accommodates the neck of the ball fitting of the joint. The skirt of the socket member is formed with a radially extending flange and extends through a circular aperture in a support carried by the aircraft in a manner which will be described hereafter. The socket is thus held rotatable about a vertical axis in the support. Below the socket and in the hollow base of the support, there is borne a shaft, with a cam or eccentric formed on it to approach and recede from the ball of the joint on rotation of the shaft, thereby controlling a clamping pad or block interposed between the ball and shaft. The block is of substantially cylindrical formation and is loosely guided in the cylindrical skirt of the socket. The upper end of the block is concave to engage the ball, whilst the other end surface is flat. The eccentrically mounted shaft carries at one end, external to the support, an operating lever accessible to the gunner. Movement of the lever in the locking sense causes the block to engage the ball frictionally and also to urge the ball and concave part of the socket into frictional contact, thereby binding or locking the two parts together. When the joint is unlocked the gun-supporting arm is free to move angularly about a horizontal axis such movement being permitted by the slot in the socket. Movement of the arm about a vertical axis is permitted by rotation of the socket in the support. In certain cases it may be desired to prevent pure rotational movement of the arm relative to the socket, a movement which is possible when the axes of the socket and arm coincide, and a device to this end comprises a slotted arm of arc formation carried by the arm and engaging a pin projecting radially from the socket. The slot and pin allow the angular move-

[Price 1/-]

Pr.

BEST AVAILABLE COPY

ment of the arm about the horizontal axis, whilst preventing the relative rotation of the joint parts about their longitudinal axes.

5 The support for the socket and locking shaft is formed with laterally extending sleeves which are secured by pins to struts extending inwardly from the sides of the fuselage of the aircraft at the upper edge of the gunner's cockpit. There is thus formed a continuous strut, 10 rigid both in tension and compression and bracing the aircraft structure. The upper extremity of the gun supporting arm, which may be adjustable in length 15 e.g. telescopically, is provided with a suitable fitting for carrying the gun, for example pivotally, preferably about a horizontal axis which is parallel to that 20 of the slot, i.e. to the axis of freedom of the arm relative to the socket. It will be noted that by use of the slotted arm and pin device as described above the horizontality of such axis will be maintained.

Further a spring may be provided for 25 resiliently urging the clamping block into engagement with the ball so as to restrain the movement of the arm in a non-positive manner.

It will be understood that inasmuch as 30 the locus of the extremity of the gun is of spherical form the gun may be positioned in numerous desirable locations, and by providing the arm of suitable length it is possible to fire vertically 35 downwards over either side of the fuselage. Further the gun may be conveniently stowed by swinging the arm below the level of the cockpit, when the gun can be accommodated in a suitable 40 recess in the fuselage.

Dated this 17th day of May, 1938.

For the Applicants,

F. J. CLEVELAND & CO.,

Chartered Patent Agents,

29, Southampton Buildings,

Chancery Lane, London, W.C.2.

COMPLETE SPECIFICATION

Improvements relating to Gun and Camera Gun Mountings

We, REID & SIGRIST LIMITED, a Company incorporated according to British Law, of Shannon Corner, Kingston By- 45 Pass, New Malden, Surrey, and CHARLES BOWER, a British Subject, of the Company's address, do hereby declare the nature of this invention and in what manner the same is to be performed, to 50 be particularly described and ascertained in and by the following statement:—

This invention relates to gun mountings, more particularly for use in aircraft, and has for an object to provide 55 mounting for a machine gun, camera gun or like weapon hereinafter referred to as a gun, which is simple in construction and which permits movement of the gun to the desired positions. A further object 60 of the invention is to permit a gun to be neatly stowed, preferably within the contour of the fuselage of an aircraft when not required for use. The invention also seeks to provide a mounting which does 65 not impede the movement of the gunner in the cockpit of an aircraft, and which is capable of being stowed beneath the cockpit cover, which can be opened when required for operation of the gun.

70 According to the present invention a gun mounting comprises a pillar or strut supporting the gun at one end and provided at the other end with a ball fitting into a complementary socket which is 75 rotatably supported in an attachment fitting and is provided with a slot with

which a neck connecting the ball with the pillar co-operates so as to constrain the pillar or strut to swing in a plane 80 which can be oriented about the axis of rotation of the socket. Thus a gun mounting in accordance with the invention may comprise a pillar or strut supporting the gun at one end and mounted 85 at the other end with at least two degrees of angular freedom, the mounting and/or attachment of the gun to the pillar permitting the gun to be moved in elevation and traverse.

In a preferred embodiment of the 90 invention, means are provided for locking the pillar in any position, in respect of the axis or axes about which it is otherwise free to move, whilst it is arranged that the nature of the attachment of the 95 gun to the pillar permits elevation and traverse of the gun. Conveniently the gun is supported on the pillar by means of a joint of a nature providing two or more pivots mutually at right angles. 100 If desired, the strut or pillar can be extensible in the telescopic sense for the purpose of varying its length.

The invention also comprises an aircraft having a gun mounting of strut or 105 pillar form as defined above in the cockpit of the aircraft, the arrangement being such that the mounting of the strut or pillar permits the gun to be raised from a stowed position to an operative position. 110 Further the degrees of freedom of mount-

ing may permit the gun to be positioned in any desired location in a locus defined by the length of the strut; this locus for a given length of strut or pillar is of spherical form, the strut or pillar being conveniently ball-jointed or otherwise mounted in a manner permitting substantially universal articulation. The length of the strut or pillar may be chosen, or be adjustable, so that the gun can be aimed over either side of the fuselage, by swinging the arm appropriately about its mounting disposed centrally within the fuselage, being for example supported on a transverse cross bar in the cockpit.

One embodiment of the invention is illustrated diagrammatically in the accompanying drawings, which show how it may be applied in an aircraft, being capable of stowage when not required for use beneath a cockpit cover portion which can be raised to uncover the gunner's cockpit when the gun is required for use.

In the drawings:—

Figure 1 is a side elevation showing a portion of a cockpit cover and fuselage of an aircraft, with the gun in the stowed condition;

Figure 2 is a view similar to that shown in Figure 1, a pivoted portion of the cockpit cover being raised, and the gun moved to a useful position from its stowage accommodation;

Figure 3 is a plan view of the arrangement shown in Figure 2, the gun and cockpit cover being in positions indicated in that Figure, while dotted positions of the strut or pillar indicate how it may be swung to either side of the fuselage;

Figure 4 is a "broken" view of the strut or pillar showing the attachment of the gun and the mounting of the pillar at its other end.

Referring to Figures 1, 2 and 3, an aircraft fuselage is indicated at 10 and is formed with a cockpit opening 11, which has a suitable transparent covering comprising a front portion 12, and a rear portion 13, which is pivoted about an axis 14 lying transverse of the aircraft so as to be capable of swinging, in known manner from a covering position as shown in Figure 1, to the raised position shown in Figure 2, where the gunner's portion of the cockpit is uncovered. The gun mounting in accordance with this form of the invention comprises a strut or pillar 15, which supports at one end a gun 16 and which is mounted at its other end on a support comprising tube portions 17 extending transversely across the cockpit. The tube portions 17 are secured by face plates 18 to the side of the cockpit,

ing may permit the gun to be positioned portions 19 of an attachment fitting by which the strut or pillar 15 is mounted. The tubes 17 and sleeve portions 19 are rivetted or pinned so as to be held against relative rotation, and the portions 17, together with the fitting form a rigid transverse strut extending across the cockpit. The constructions of the attachment fitting by which the strut or pillar 15 is mounted, and of the attachment of the gun 16 on the strut or pillar, are described in greater detail with reference to Figure 4. The attachment of the gun on the strut or pillar 15 is, however, of a nature permitting both traverse and elevation of the gun on the pillar and freedom permitted by the attachment fitting mounting the pillar in the aircraft, allows the gun to be raised from a stowed position, as shown in Figure 1, into an operative position such as shown in Figure 2. In the stowed position the forwardly extending barrel portion of the gun enters a recess in the upper surface of the fuselage. The freedom permitted by the attachment fitting of the strut 15 in the aircraft also allows the strut to swing to positions such as shown in dotted lines in Figure 3, which allow the gun to be aimed in a downward direction over either side of the fuselage. For this purpose the length of the strut or pillar should be somewhat in excess of half the width of the cockpit.

In Figure 4 the gun attachment, and fitting by which the strut or pillar is mounted in the aircraft, are shown in greater detail. The strut or pillar 15 comprises inner and outer telescoping parts 15A and 15B respectively, which permit the effective length of the pillar to be varied, whilst a clamping device comprising a split collar 20, which can be tightened on the outer telescoping part 15B by means of a hand knob 21, is arranged to lock the parts 15A and 15B against relative telescoping movement; such movement is permitted, when the clamping collar 20 is released by expansion of the outer tube 15B in the vicinity of longitudinal slits 22. At its upper end on the outer extremity of the part 15A, the strut or pillar carries a fitting 23 through which the attachment of the gun is effected. The attachment joint comprises a joint permitting pivoting about two pivot axes which are at rightangles. The fitting 23 is bored at an angle inclined to the longitudinal axis of the pillar and the bore receives a spigot device 24 which is rotatable in the fitting 23 about the axis of the bore, being retained therein by a washer 25 clamped on the end of a cylin-

drical portion of the spigot by means of a nut 26 engaging a pin 27 fast with the spigot device. It will be appreciated that the washer 25 bears against the extremity 5 of the cylindrical portion of the spigot 24 and forms a projecting flange retaining the spigot in position in the fitting 23. The first axis of freedom of the attachment is therefore provided by the axis 10 A—A, whilst on the second, C—C, at rightangles thereto, pivots a fitting 28 on the spigot 24, the fitting being rigid with the gun 16. It will be appreciated that the arrangement described above permits 15 traverse and elevation of the gun in any position of the strut or pillar 15.

At the lower end of the strut or pillar the outer telescoping part 15B carries a ball fitting 30 of a ball and socket joint, 20 the socket part 31 of which is internally hemispherically concave, with a downward cylindrical skirt portion having a radially extending flange 32. In the hemispherical curved wall of the socket 25 31 there is a slot 33 formed as an arc lying in a plane passing through the axis of the cylindrical skirt portion, and this slot accommodates the neck 34 of the ball fitting of the joint. The attachment fitting having the sleeve portions 19 30 referred to above is indicated at 35 and is bored at 36 transversely to the axis of tube portions 17, and the diameter of the bore is reduced somewhat as shown in 35 Figure 4 at its upper end, so as to correspond to the external diameter of the cylindrical skirt of the socket 31, whilst the external diameter of the radially extending flange 32 corresponds approxi- 40 mately to the internal diameter of the rest of the bore. Thus the socket 31 can be inserted through the bore 35, so that its hemispherical part projects above the attachment fitting 35. It is thereby 45 arranged that the socket 31 is rotatable about the axis of the bore 36, so as to permit the strut or pillar 15 to be swung about that axis, whilst when the axis of the pillar and axis of the bore are co- 50 linear the pillar may be rotated relative to the attachment fitting 35 without rotating the socket 31. In certain cases, in order to maintain the axes A—A and B—B always in the plane of swinging 55 permitted by the slot 33, it may be found desirable to form the neck 34 with flat faces co-operating with the sides of the slot 33 to prevent relative rotation of the pillar 15 and socket 31. It will be appre- 60 ciated that this may be desirable so that stowage is readily effected in the correct manner with the axis C—C lying horizontal as shown in Figures 1 and 2.

Below the socket 31 and rotatable in 65 the fitting 35 is a shaft 37 which has a

portion 38 which is eccentric to its axis of rotation. The shaft 37 is borne in the fitting in bushes 39 and is rotated by means of an operating lever 40 pinned to the shaft. The rotation of the shaft 37 70 controls, by means of the eccentric portion 38, movement of a pad or block 41 which is circular in section and is loosely guided in the bore 36. At its upper end it is recessed in spherical formation to 75 correspond with the surface of the ball 30, being lightly urged into co-operation therewith by springs 42 interposed between its lower surface and a cap 43 closing the lower end of the bore 36. 80 Angular movement in the appropriate sense of the operating lever 40, which is in a position readily accessible to the gunner, effects movement of the block 41 85 into a position where it is forcibly urged into co-operation with the ball 30, whereby the socket and ball are frictionally bound or locked together. When so 90 locked the pillar 15 is held in any particular setting or adjustment, whilst when the lever 40 is operated for un- locking the pillar or strut 15 is free to move as mentioned above. The lever 40 may be operated by Bowden or other suitable 95 mechanism operated by a twist control located on the column 15, in a convenient position for the gunner to operate the locking mechanism, and to guide the column at the same time.

It will be understood that the attach- 100 ment of the pillar 15 to the aircraft in the manner described above provides the arm with two degrees of angular free- dom, one being controlled by the slot 33 in the socket 31, whilst the second is pro- 105 vided by swinging about the axis of the bore 36 by rotation of the socket 31 in the fitting 35. Thus in order to arrive at a position such as shown in dotted lines in Figure 3 the socket is rotated to 110 direct the arm in the required sense, after which it can be swung downwardly, constrained by the slot 33, the axis A—A and slot 33 lying in the same plane. It is 115 thereby arranged that the gun is at all times beyond the end of and above the pillar, whilst its attachment to the pillar has freedom permitting movement for elevation and traverse.

Having now particularly described and 120 ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A gun mounting comprising a pillar 125 or strut supporting the gun at one end and provided at the other end with a ball fitting into a complementary socket which is rotatably supported in an attachment fitting and is provided with a slot with 130

which a neck connecting the ball with the pillar co-operates so as to constrain the pillar or strut to swing in a plane which can be oriented about the axis of rotation of the socket.

2. A mounting as set forth in Claim 1, provided with means for locking the pillar or strut in any position, in respect of the axes about which it is otherwise free to move.

3. A mounting as set forth in Claim 1 or 2, in which a frictional locking device is provided for the ball fitting.

4. In an aircraft, a gun mounting as claimed in any previous claim, in which the pillar or strut is mounted in a manner permitting the gun to be raised from a stowed position into an operative position.

5. A gun mounting as set forth in any previous claim, in which the pillar or strut is telescopically extensible.

6. A mounting as set forth in any preceding claim, in which an axis permitting traverse of the gun lies in the plane of swinging of the pillar or strut.

7. A mounting as set forth in any previous claim, wherein the gun is attached to the pillar or strut through the medium of a joint permitting movement of the gun in traverse and elevation.

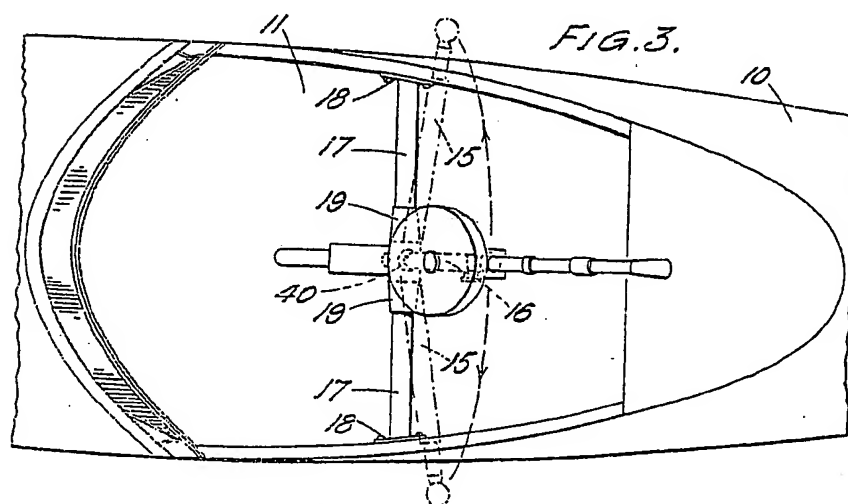
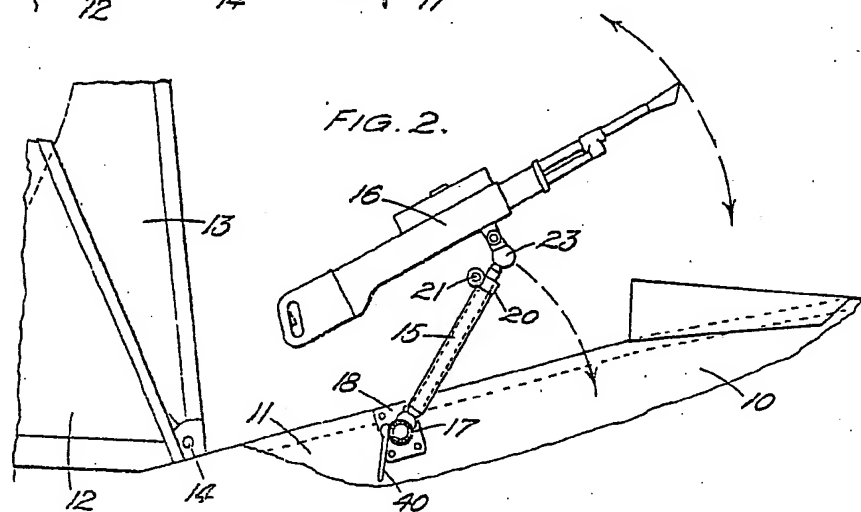
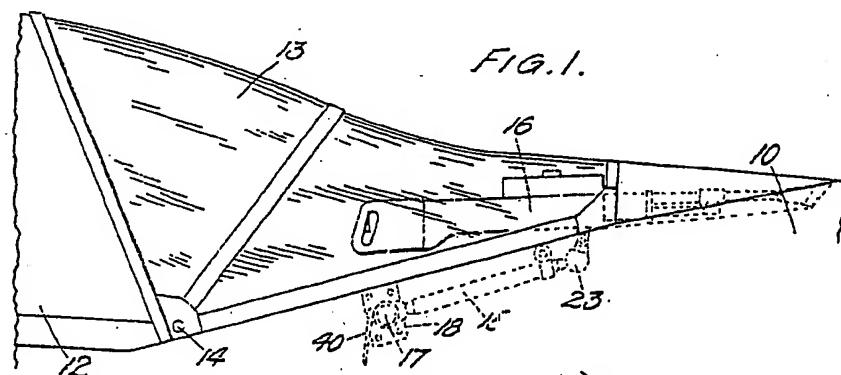
8. In an aircraft a gun mounting as set forth in any previous claim, substantially as described with reference to the accompanying drawings.

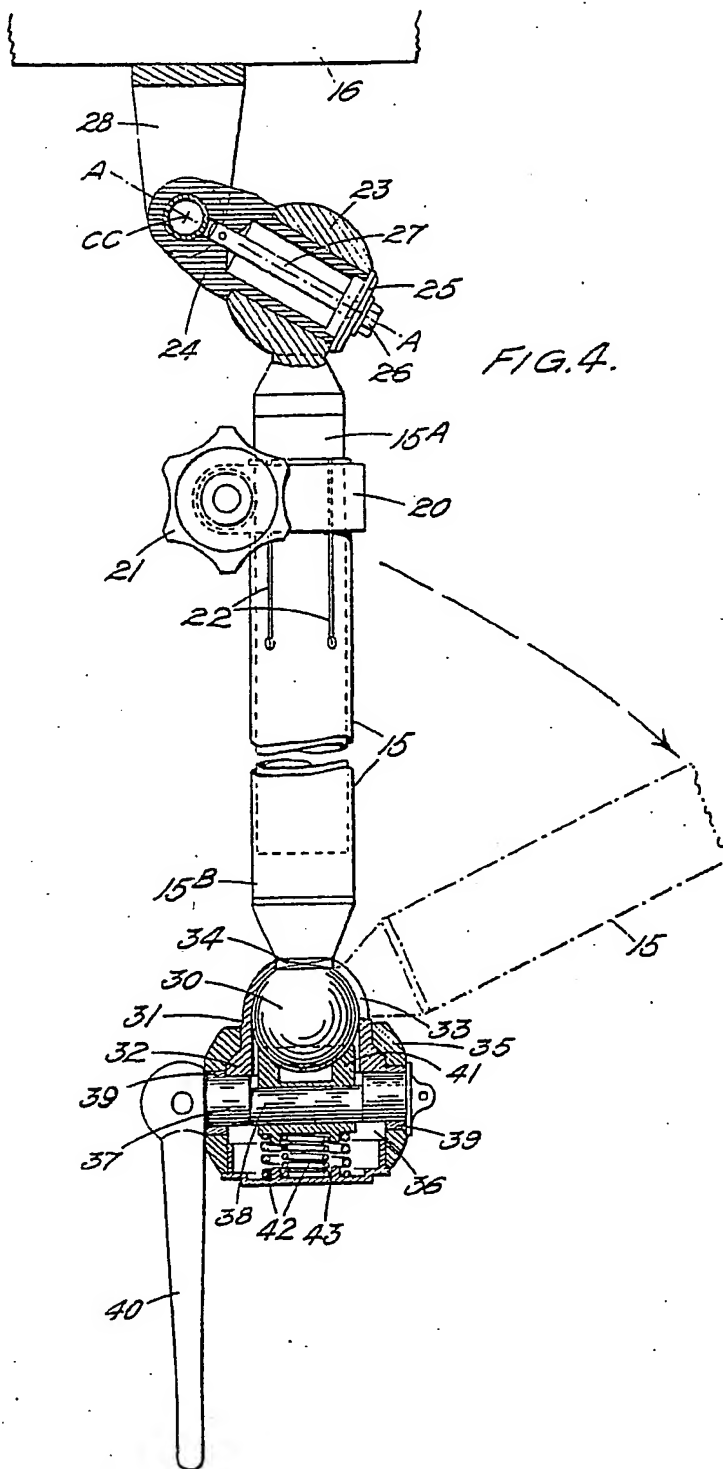
Dated this 10th day of July, 1939.

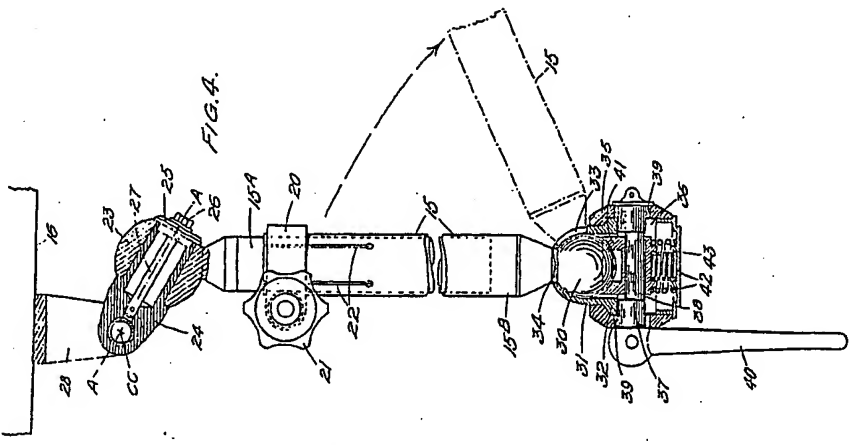
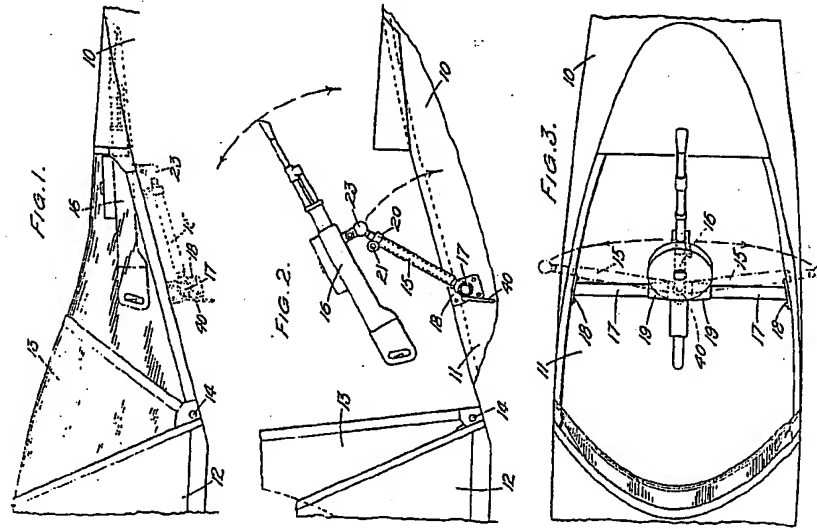
For the Applicants,
F. J. CLEVELAND & CO.,
Chartered Patent Agents,
29, Southampton Buildings,
Chancery Lane, London, W.C.2.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1946. Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies, price 1s. 0d. each (inland) 1s. 1d. (abroad) may be obtained.

[This Drawing is a reproduction of the Original on a reduced scale.]







[This Drawing is a reproduction of the Original on a reduced scale.]